5780_Prelab_03

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1 :

A few things you can learn from a peripheral's functional description in the peripheral reference manual are:

- Modes of operation/configurable options.
- Timing information and Clock sources.
- Data transfer/communication protocols.

2 :

"Time-base unit" is the title of the first sub-section in the functional description of timers 2 and 3. It talks about how the timer uses a register as the 'current counting value' and there is a reset value for when overflow (up-counting) or underflow (down-counting) occur.

3 :

The prescaler (PSC) can divide the counter clock frequency by any factor between 1 and 65536. **It's primary purpose is to divide the clock signal and allow for adjustments to the timer's counting rate**. It can be changed on the fly as the control register is buffered. The new prescaler ratio is taken into account at the next update event.

4

The purpose of the Auto-Reload (ARR) register is to hold a 'reset' value for counting. When this value is reached, one event is counted.

- In upcounting mode, the counter counts from 0 to the auto-reload value (content of the TIMx_ARR register), then restarts from 0 and generates a counter overflow event. Also, upon an update, the value in the prescaler register is written into the ARR.

- In downcounting mode, the counter counts from the auto-reload value (content of the TIMx_ARR register) down to 0, then restarts from the auto-reload value and generates a counter underflow event.
- In center-aligned mode it gets reset to 1 or 0 depending on if underflow or overflow has occured.

5 :

– Each Capture/Compare channel is built around a capture/compare (CCRx) register, an input stage for capture, and an output stage with comparator and output control.

– Output compare mode is used to control an output waveform or indicate when a period of time has elapsed.

The value in the CCRx register is compared with the counter to detect when a match is found between the output pin's value and the counter. When they are equal, the output compare function may perform a series of operations (drive output pin value, set flags, trigger interrupts, send a memory access requests, etc..).

This is useful for controlling output waveforms, monitoring physical systems, and triggering internal system responses to outside events.

6 :

Pulse-Width-Modulation is a method of approximating an analog signal using only digital hardware; it operates by using a high-frequency rectangular-wave signal where every period is a ratio of on and off time. **The duty cycle represents the ratio of 'on'/'logically high' time to the total cycle time**. The ratio of the CCRx and ARR registers sets the duty cycle.

7 :

There are 4 states that can exist in the GPIO MODER register: input, output, analog, and alternate function mode. **Normally, each peripheral controls the states of its output pins. The Alternate Function mode in the GPIO MODER register allows external peripherals (such as a timer) to control them**.

8 :

Alternate function assignments are specific to the STM32F0 device used. This means that **information on pin alternate functions is found within**

the device datasheet and not the peripheral reference manual.